WHAT IS CLAIMED IS:

1. A cracking tube comprising:

a first layer on an interior surface of the tube; and

a second material surrounding the lining,

wherein the first layer is an iron aluminide alloy having a coefficient of thermal expansion substantially the same as the coefficient of thermal expansion of the second material over the temperature range of ambient to about 1000 °C.

2. The cracking tube of claim 1, wherein the iron aluminide alloy is a sintered iron aluminide alloy or a composite of iron aluminide alloy.

3. The cracking tube of claim 1, wherein the second material is INCO 803 or HP steels.

4. The cracking tube of claim 1, wherein the iron aluminide alloy includes at least 2 vol.% transition metal oxides selected from alumina, yttria, ceria, zirconia, or lanthanum.

5. The cracking tube of claim 4, wherein the iron aluminide includes at least 14 wt.% aluminum.

6. The cracking tube of claim 4, wherein the iron aluminide alloy includes an additive present in an amount which improves metallurgical bonding between the oxide filler and the iron aluminide alloy, the additive comprising at least one refractory carbide.

7. The cracking tube of claim 1, wherein the iron aluminide alloy comprises:

14-32 wt.% Al;

10-14 vol. % transition metal oxides;

0.003 to 0.020 wt.% B;

0.2 to 2.0 wt.% Mo;

0.05 to 1.0 wt.% Zr;

0.2 to 2.0 wt.%Ti;

0.10 to 1.0 wt.% La;

0.05 to 0.2 wt.% C;

balance Fe; and

optionally, ≤ 1 wt.% Cr.

8. The cracking tube of claim 1, wherein the first layer comprises an extruded layer on the inside of the tube.

9. The cracking tube of claim 1, wherein the alloy is in the form of a nanocrystalline intermetallic powder.

10. A method of reforming a hydrocarbon feed in the cracking tube of claim 1, comprising passing of a mixture of steam and the hydrocarbon feed through the cracking tube while heating the tube to at least 800° C.

11. A method of manufacturing the cracking tube of claim 1, comprising the steps of:

forming the first layer from a powder of 14-32 wt. % Al, 10-14 vol. % transition metal oxides, 0.003 to 0.020 wt.% B, 0.2 to 2.0 wt.% Mo, 0.05 to 1.0 wt.% Zr, 0.2 to 2.0 wt.%Ti, 0.10 to 1.0 wt.% La, 0.05 to 0.2 wt.% C, balance

including Fe, and optionally ≤ 1 wt.% Cr, the powder having been prepared by mechanical alloying, gas atomization, or water atomization techniques.

12. The method of claim 11, wherein transition metal oxides are oxides of aluminum, yttria, ceria, zirconia, or lanthanum

13. The method of claim 12, wherein transition metal oxides are Al_2O_3, Y_2O_3, CeO, Zr_2O_3, or LaO.

14. The method of claim 11, wherein the first layer is formed by co-extrusion with the second material of the cracking tube, the co-extrusion carried out at a minimum of 800 °C by using a cold isostatically pressed (CIP) billet or a hot isostatically pressed (HIP) billet.

15. The method of claim 14, wherein the billet formed by cold isostatic pressing is obtained by reaction synthesis or mechanical alloying of iron aluminide with mixed oxides.

16. The method of claim 11, wherein the second material of the cracking tube is an INCO 803 steel, a HP steel, or one of the Fe-, Cr-, or Ni-based alloys with a minimum of 10 wt.% of Cr or Ni.

17. The method of claim 11, wherein the first layer is formed by thermal spraying techniques.

18. The method of claim 17, wherein thermal spraying techniques are plasma spraying or high velocity oxy-fuel spraying.

19. The method of claim 11, wherein the first layer comprises a cladding.

20. The cracking tube of claim 1, further comprising:

an intermediate layer disposed between the first layer and the second material,

wherein the intermediate layer has a coefficient of thermal expansion between the coefficients of thermal expansion of the first layer and the second material

21. A method of reducing coking and carburization in a cracking tube having a metallurgically modified surface on the inner diameter surface thereof and the cracking tube is used in an environment in which hydrocarbon feedstock is thermally and/or catalytically converted to hydrocarbon products, comprising:

heating the cracking tube to a first temperature at which cracking of hydrocarbon feedstock occurs;

flowing hydrocarbon through the cracking tube; and

producing an effluent containing a desired hydrocarbon product,

wherein the metallurgically modified surface is an iron aluminide alloy having a coefficient of thermal expansion substantially the same as the coefficient of thermal expansion of a second material of the cracking tube over the temperature range of ambient to about 1000 °C, and wherein the modified surface is substantially coke and carburization-free after a period of time in which a similar cracking tube without the metallurgically modified surface of iron aluminide alloy exhibits coking and carburization.

22. The method of claim 21, wherein the iron aluminide alloy comprises:

14-32 wt.% Al;
10-14 vol. % transition metal oxides;
0.003 to 0.020 wt.% B;
0.2 to 2.0 wt.% Mo;
0.05 to 1.0 wt.% Zr;
0.2 to 2.0 wt.%Ti;
0.10 to 1.0 wt.% La;
0.05 to 0.2 wt.% C;
balance Fe; and
optionally, $\leq$ 1 wt.% Cr.

23. In a process of producing hydrocarbon products from feedstock utilizing a cracking tube, the improvement comprising passing the feedstock through a cracking tube having a metallurgically modified surface of iron aluminide alloy disposed on the inner surface of the cracking tube such that feedstock is in fluid communication with the metallurgically modified surface.

24. In the process of claim 23, wherein the metallurgically modified surface is an iron aluminide alloy having a coefficient of thermal expansion substantially the same as the coefficient of thermal expansion of a second material of the cracking tube over the temperature range of ambient to about 1000 °C.

25. In the process of claim 23, wherein the iron aluminide alloy comprises:

14-32 wt.% Al;
10-14 vol. % transition metal oxides;
0.003 to 0.020 wt.% B;
0.2 to 2.0 wt.% Mo;
0.05 to 1.0 wt.% Zr;
0.2 to 2.0 wt.%Ti;
0.10 to 1.0 wt.% La;
0.05 to 0.2 wt.% C;
balance Fe; and
optionally, ≤ 1 wt.% Cr.

26. In the process of claim 23, wherein the period of time between successive decoking operations is extended by at least 10 percent as compared to the time between successive decoking operations in a substantially similar cracking tube that does not have a metallurgically modified surface of iron aluminide alloy disposed on the inner surface and in fluid communication with the feedstock.

27. In a cracking tube, the improvement comprising:

a metallurgically modified surface of iron aluminide alloy disposed on the inner surface of the cracking tube,

wherein the feedstock is in fluid communication with the metallurgically modified surface and wherein the coefficient of thermal expansion of the iron aluminide alloy is substantially the same as the coefficient of thermal expansion of a second material of the cracking tube over the temperature range of ambient to about 1000 °C, the second material an outer material for the cracking tube.

28. In the cracking tube of claim 27, the improvement further comprising:

an intermediate layer disposed between the iron aluminide alloy and the second material, the intermediate layer having a coefficient of thermal expansion between that of the iron aluminide alloy and the second material.

29. In the cracking tube of claim 27, wherein the iron aluminide alloy comprises:

14-32 wt.% Al;
10-14 vol. % transition metal oxides;
0.003 to 0.020 wt.% B;
0.2 to 2.0 wt.% Mo;
0.05 to 1.0 wt.% Zr;
0.2 to 2.0 wt.%Ti;
0.10 to 1.0 wt.% La;
0.05 to 0.2 wt.% C;
balance Fe; and
optionally, $\leq$ 1 wt.% Cr.